View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by College of William & Mary: W&M Publish

William & Mary
CHARTERED 1693

W&M ScholarWorks

Reports

Fall 2009

Evolving Guidance for Tidal Wetlands Management

Center for Coastal Resources Management, Virginia Institute of Marine Science

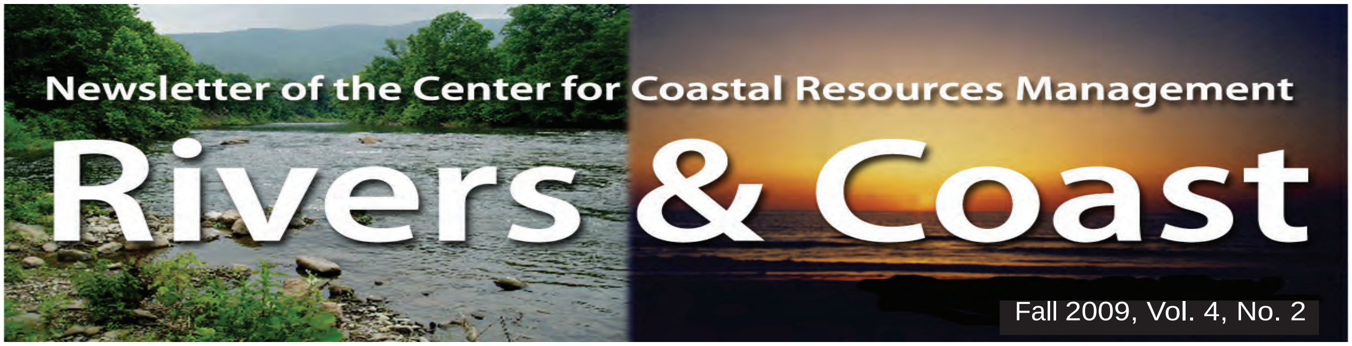
Follow this and additional works at: https://scholarworks.wm.edu/reports

Part of the Natural Resources Management and Policy Commons, and the Terrestrial and Aquatic Ecology Commons

Recommended Citation

Center for Coastal Resources Management, Virginia Institute of Marine Science. (2009) Evolving Guidance for Tidal Wetlands Management. Rivers & Coast, Fall 2009 issue. v.4, no.2. Virginia Institute of Marine Science, College of William and Mary. http://dx.doi.org/doi:10.21220/m2-msfe-kq06

This Newsletter is brought to you for free and open access by W&M ScholarWorks. It has been accepted for inclusion in Reports by an authorized administrator of W&M ScholarWorks. For more information, please contact scholarworks@wm.edu.



The Center for Coastal Resources Management at VIMS has a mission to support integrated and adaptive management of coastal resources. We have been working to develop updated science-based guidance for shoreline resource management. One such effort has been focused on the existing Wetlands Guidelines originally written in the early 1970s. This process began with a review of the science regarding wetlands as part of the shoreline ecosystem and the services wetlands provide. The previous issue of this newsletter described the ecosystem services of tidal wetlands along the shoreline. This issue focuses on a set of criteria used by VIMS to review shoreline projects. The guidance provided is intended to promote sustainable decisions about Virginia's tidal wetlands.

✤ ✤ ✤

Evolving Guidance for Tidal Wetlands Management

Historically, Virginia's shorelines provided critical access for commerce and trade. While this is still true today the waterfront is also an increasingly popular choice for residential living. Years of human use have resulted in wetland losses and adverse impacts on tidal wetland and shoreline functions that have diminished the resource and adversely affected the role of wetlands in the ecosystem.

In addition to direct losses due to human activities, some wetland loss is linked to sea level rise and erosion. Wetlands disappear as the sea level rises faster than marshes are able to grow upward by accumulating sediment and organic matter, or move landward. Impediments to landward migration include erosion control structures, roads, other infrastructure and natural topography.

The scientific understanding of the role of tidal wetlands and the connection between wetlands and riparian lands and subaqueous lands has continued to evolve and improve. Cumulative wetlands losses, modifications of riparian buffers and impacts to submerged aquatic vegetation (SAV) and subaqueous lands are linked to the degradation of the ecosystem.

Persistence of these critical ecosystems will require sound planning and management to accommodate natural processes while addressing human impacts through the application of preferred alternatives in the decision-making process.

Appropriate management of Virginia's tidal wetlands was the focus of the Tidal Wetlands Guidelines originally adopted by the Marine Resources Commission in 1974. The first guidelines, based on the 1972 Tidal Wetlands Act covered only vegetated wetlands. Following addition of non-vegetated wetlands to the Act, the guidelines were amended to include non-vegetated wetlands in 1982. The Wetlands Mitigation-Compensation Policy of 1989 was added to the Guidelines in 1993 and updated in 2005. While these later amendments were critical changes to the Guidelines that focused on the Mitigation-Compensation policy, the original content and construct of the guidelines, circa 1970's, has remained largely unchanged.

Integrated resource management decisions regarding tidal wetlands call for changes to the guidance upon which those decisions are made. This newsletter highlights the kind of changes necessary to update tidal wetlands guidance, particularly, changes to the criteria for review of wetland projects.

Rivers & Coast is a biannual publication of the Center for Coastal Resources Management, Virginia Institute of Marine Science, College of William and Mary. If you would like to be added to or removed from the mailing list, please send correspondence to:

Rivers & Coast/CCRM
P.O. Box 1346
Gloucester Pt., VA 23062
(804) 684-7380
dawnf@vims.edu

CCRM Director: Dr. Carl Hershner

Contributing Author: Pam Mason

Layout: Ruth Hershner

This report was funded, in part, by the Virginia Institute of Marine Science and by the Virginia Coastal Zone Management Program of the Department of Environmental Quality through Grant #NA08NOS4190466-Task#8 of the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resources Management, under the Coastal Zone Management Act, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies or DEQ.

Printed on recycled paper

Integrated Shoreline Management

To reduce the cumulative and secondary impacts of activities within the multiple jurisdictions of the various management programs affecting the littoral and riparian zones, integration of policies and practices is necessary. Since each regulatory and non-regulatory program has a mission of environmental improvement, even though jurisdictions are varied, it should be important to optimize ecosystem services along and across shore when making decisions. Emphasis should be placed on the preservation or enhancement of attributes (such as riparian vegetation and wetlands) that contribute to habitat, water quality and sediment stabilization.

General Criteria for Shoreline Projects

1. Preference for sustainable actions

Shorelines ecosystems are composed of interacting components of natural resources including tidal wetlands, riparian uplands and nearshore waters. Impacts in one part of the system can adversely impact ecosystem services of adjacent resources. The adverse effects of actions along the shoreline and adjacent uplands can accumulate beyond threshold levels for healthy marine fauna. Therefore, activities that impact subaqueous, intertidal and/or riparian zones should be avoided whenever possible.

Cumulative impacts of shoreline hardening and associated upland modifications. Upland modifications include addition of impervious surface, land clearing and loss of riparian buffer.
Shoreline hardened between 2003-2007 = 3,218ft
Cumulative wetland loss (in square feet) = 1158 vegetated, 4978 non-vegetated

2. The following should be avoided:

- Placement of fill or dredged material in wetlands
- Dredging through wetlands
- Flooding wetlands as a result of impoundment construction.

3. Adverse impacts of projects should be minimized by appropriately designing and constructing for the physical setting.

These two structures are not built according to convention. The revetment is considered finished, yet does not protect the base of the bank most prone to erosion, and the bulkhead is constructed with horizontal sheeting. Given this, it is unlikely that they will provide the desired erosion protection. At the same time failure of these structures will result in rock and wood debris and adverse impacts to the marine environment.

Specific Criteria for Shoreline Projects

1. Shoreline erosion protection is justified only when erosion has the potential to result in significant loss of property and upland improvement.

2. Preserving, creating or enhancing natural systems such as marshes, beaches and dunes is always the preferred approach to shoreline erosion protection. The use of vegetative solutions to shoreline erosion is often referred to as the living shoreline approach.

3. The preferred management approach will depend upon the cause of the erosion, the relative energy on the shoreline, and the presence of natural resources and anthropogenic features. Assessment of these elements may identify the need for more than one approach along the shoreline.

4. Shoreline management approaches can be grouped in order of preference as follows:

- No action, maintain or enhance natural shoreline features
- Non-structural techniques,
- Combined non-structural and structural techniques, and
- Structural techniques.

This Living Shoreline uses a hybrid approach of a planted marsh with a gapped sill on the channelward edge.

✤ No action, maintain or enhance natural shoreline features

Erosion control efforts should be avoided unless there is a risk of significant loss of property and upland improvement. Activities to restore or enhance the ecology of the shoreline by planting riparian and/or wetland vegetation may be possible.

✤ Non-structural techniques

a. Planting marsh and or riparian vegetation can address water flow as a cause of erosion whether from tidal waters, upland runoff, or both. Native vegetation is preferred due to the greater likelihood for successful establishment and the provision of native habitats.

b. Marsh grasses and shrubs grow best in full sun conditions. Establishment of marsh vegetation may require some modification of riparian vegetation such as pruning or selective tree removal to ensure adequate sunlight.

c. Bank grading and vegetative plantings can minimize the risk of bank failure and re-established vegetation should provide non-point source pollution treatment. To maximize water quality and habitat benefits, the newly graded slope should be re-vegetated with multiple strata (different layers of vegetation), including woody and herbaceous species.

✤ Combination techniques

Combination techniques include the preservation or creation of a natural feature, a marsh or a beach, in combination with a hard structure. Combination techniques include:

a. A Marsh toe revetment/ sill is a structure, typically stone, placed channelward of an existing or created marsh to buffer the marsh from wave energy, while the marsh provides natural erosion control, and water quality and habitat services. The structure may be sloped against the eroding marsh or free standing immediately channelward of the marsh.

These structures limit the connection between intertidal and subaqueous areas and convert native soils and vegetated areas to non-native rock. Design features such as gaps and low spots in the elevation of the structure can be incorporated to improve animal access to the marsh.

b. A Sill is a free standing structure placed channelward to protect an existing or enhanced, sand flat or beach.

Sill structures limit the connection between intertidal and subaqueous areas and convert native soils and vegetated areas to non-native rock.

c. A Breakwater is comprised of two elements: one or more free standing structures placed in the nearshore waters, and sandy material used as beach nourishment

Breakwaters cause the conversion of nearshore shallow waters to rock, or other non-native material, and sandy shoreline. The construction of the breakwater will cause temporary water quality impacts and may interrupt sediment transport. Breakwaters are most effective on high energy sandy shorelines when designed for a shoreline reach.

d. A Groin is a structure, or structures, placed shore perpendicular to hold an existing or enhanced sand flat or beach.

Groins will, by design, interrupt sediment transport along shore. This will likely result in a downdrift sediment deficit associated with increased erosion risk and the loss of intertidal habitats.

The beach element of the groin field provides the desired erosion protection creating distance between the upland and the waterway and run-up for wave dissipation. It is generally preferred to nourish groins with clean beach quality sand when they are constructed. The channelward end of groins should be low profile in design to allow sand to move downdrift.

✤ Structural techniques

a. Onshore revetments sever one or more of the connections between riparian, intertidal and subaqueous areas. Revetments cover native soils and vegetated areas with non-native rock. The result is a loss in the provision of water quality improvement processes and a change in the benthic community and associated forage animals.

b. Bulkheads sever one or more of the connections between riparian, intertidal and subaqueous areas. They alter the natural curve of the shoreline, and may remove undercut crevice habitat, reduce shallow water habitat, and result in the direct loss of wetland and upland vegetation. Bulkheads also change nearshore wave dynamics, may cause increased erosion to wetlands and adjacent properties, and typically contribute to their own demise by reflecting wave energy to erode the substrate channelward of the structure. The common practice of bulkhead replacement 2 feet channelward of an existing wall results in additional encroachment over time and the cumulative conversion of wetlands or subaqueous lands to upland.

The standard practice of bulkhead replacement 2 feet channelward of the old bulkhead results in the cumulative loss of marine resources.

Dredging

Dredging has the potential to impact many of the services provided by and for the natural marine/estuarine ecosystem. Dredging re-suspends bottom sediments in the water column, which adversely impacts water quality. The increase in turbidity from dredging operations is generally considered to be a temporary impact. When material to be dredged includes fine-grained sediments, such as silt and clay, which remain in suspension for a long time, the adverse impact to water quality can be widespread in both area and time. In addition, dredging eliminates the existing bottom-dwelling organisms. The timeline for recovery of this community and the ecological services it provides is not well known.

Dredging can cause a significant disruption of the marine environment, and it often must be repeated in order to maintain water depths.

- Construction of open pile piers to reach existing navigable depths is generally preferred to dredging.
- Dredge area should be limited to that necessary for navigation.
- Dredging that takes place adjacent to wetlands should maintain an adequate buffer between the dredge cut and the wetlands in order to prevent slumping and loss of the wetlands. Generally, the toe of the side slope of the design channel should be located at a horizontal distance from the channelward edge of the wetland (i.e., mean low water) that is at least 4 times the depth of dredged material to be removed.
- Dewatering and disposal of dredged material in upland sites away from the shoreline is preferable to overboard disposal.
- Re-handling of the dredged material should be avoided.
- Design specifications for dredged material disposal areas or identification of an approved disposal site are necessary.
- Dredge material is generally unacceptable as backfill.
- Sandy dredge material is considered an important resource and should be used in a beneficial manner along tidal shores.

Channeling into uplands and marshes should be avoided. Creating navigable water by dredging into and through marshes and uplands has an adverse effect on ambient water quality. The channels are typically poorly flushed often leading to reduced dissolved oxygen levels, high nutrient and sediment concentrations and associated algal blooms and fish kills. These areas are likely to accumulate sediment and require repeated dredging maintain water depths.

Shallow water dredging can result in the direct loss of wetlands, indirect losses due to wetland slumping and adverse changes to the ecosystem linkages between the wetlands and adjacent shallow waters.

Stormwater Facilities and Best Management Practices (BMPs)

As tidal wetlands are waters of the Commonwealth, stormwater management practices should be located on uplands outside of tidal wetlands.

Stormwater outfalls should be placed landward of tidal wetlands. In this manner, the existing wetlands will serve as a buffer providing additional treatment of the quality and flow of the stormwater. Project design should address dissipation of flow to the wetland and receiving waters.

Marinas

Marina activities can adversely impact the water quality and habitat ecosystem services of shoreline and coastal resources.

Marinas should be located in areas that are suitable. These sites will be those that have few habitat resources, no SAV, adequate water depth, and good flushing to reduce impacts to water quality.

Utility Crossings

Impacts to wetlands and subaqueous bottom should be avoided by using directional drilling.

If the crossing will require trenching or dredging, conducting the work quickly and as cleanly as possible may minimize the quantity and duration of the adverse effects from increased turbidity.

All impact areas should be restored to their pre-construction contours and planted as appropriate with wetland plantings.

Aquaculture

Shellfish are an important component of the Chesapeake Bay ecosystem. They help increase water clarity by filtering their surrounding water, contribute to the aquatic food chain, and provide habitat for other aquatic species. While generally considered beneficial, aquaculture projects can result in temporary re-suspension of sediments resulting from aquaculture practices, the loss of aquatic bottom for other resources, and potential secondary impacts on tidal shoreline resources.

Use of aquaculture Best Management Practices, appropriate to the particular aquaculture operation, can minimize adverse environmental impacts.

Placement of aquaculture related infrastructure in submerged aquatic vegetation (SAV) should be avoided.

Temporary Impacts

Temporary impacts associated with construction activities should be limited to only that area and time which is necessary for construction or installation of the proposed project. Appropriate erosion and sedimentation controls should be installed outside of the impact areas to minimize additional secondary impacts to adjacent wetlands and waterways. All impacted areas should be restored to their pre-construction contours. If impact areas are vegetated, restoration should include planting with appropriate wetland vegetation. Post restoration monitoring should be required.

Flooding and Sea Level Rise

Shoreline erosion protection techniques are generally not effective to address tidal flooding as they are designed to dissipate and reflect wave and tidal energy rather than serve as watertight defenses to keep out tidal waters.

Protection of structures from tidal flooding is best accomplished by moving the structures inland or elevating them above flood level.

The use of a revetment or soil berms (levees) placed landward of the wetlands may provide protection from flooding. However, the same structure may hold stormwater on-site that would normally flow off-site and/or into the adjacent waterway.

✤ ✤ ✤

Examples of sea level rise may be observed throughout Tidewater Virginia, such as this drowned cedar tree.

Legislative Perspective

All of Virginia's marine resources are facing dramatic challenges, including tidal wetlands. Wetlands are critical to a healthy Bay ecosystem. Wetlands help clean the waters and provide refuge, nursery and forage for blue crab, striped bass and shorebirds. Wetlands are lost due to filling and dredging, shoreline modifications and natural changes. Stemming these losses will require new thinking about wetland management.

✤ Adopt requirements for living shorelines. Living shorelines use vegetation for erosion protection.

✤ Require justification and compensation for traditional shoreline hardening structures, like bulkheads and on-shore revetments.

✤ Prepare for wetland survival in the face of sea level rise. Wetlands are disappearing. Planning for retreat – or movement back into the upland – will be critical for wetland survival.

Email Users!

We have an email list that we use to contact folks regarding pending workshops, to check that we are using the proper contact information, and, on occasion, to request resource related information. We have plans to go electronic to provide additional information on shorelines and shoreline management issues. If you would like to receive email notifications and news, please let us know. Just email wetlands@vims.edu and tell us you want to be on the email list.

Thanks!